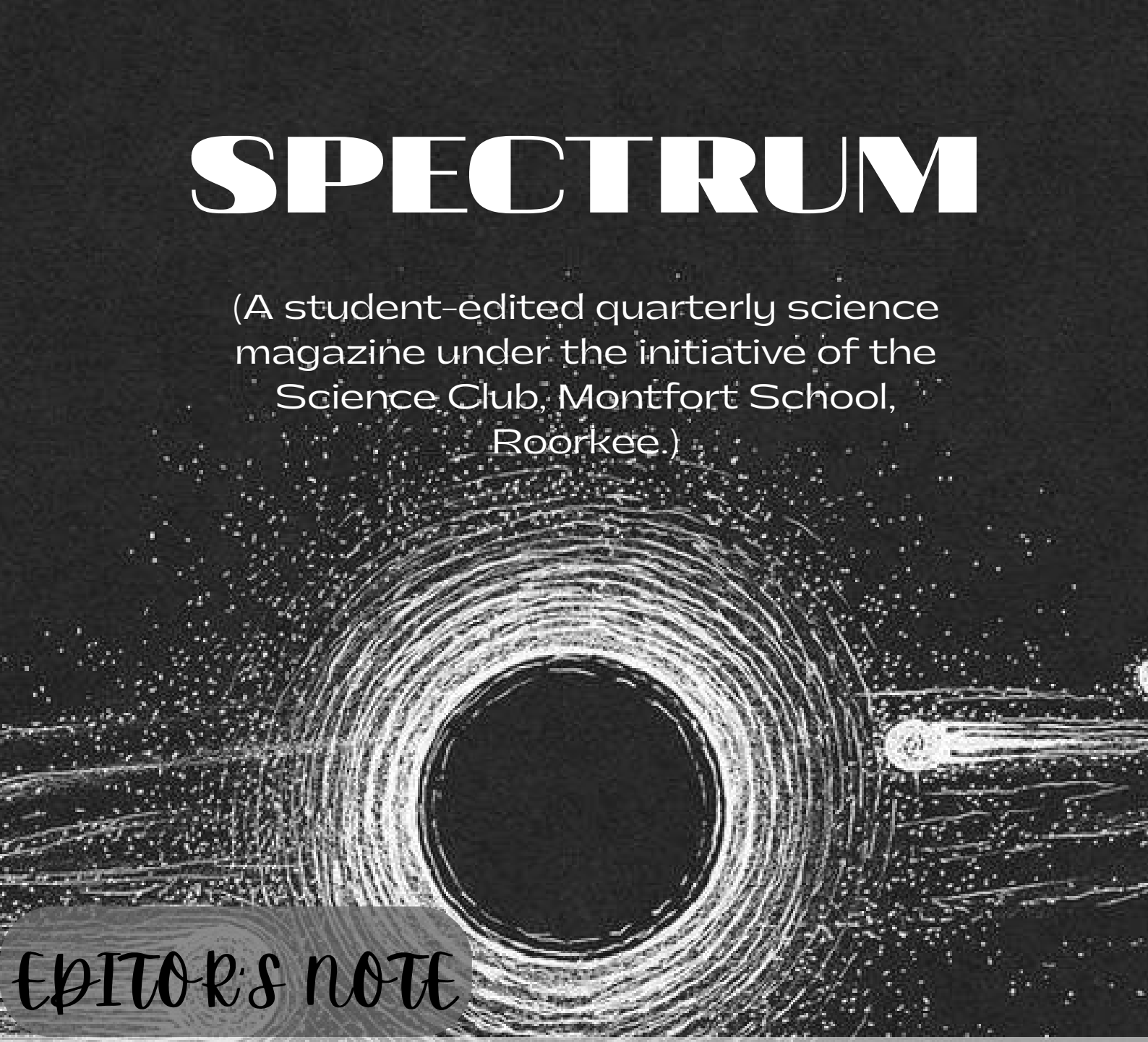
SPECTRUM

(A student-edited quarterly science magazine under the initiative of the Science Club, Montfort School, Roorkee.)



EDITOR'S NOTE

The second edition of our science magazine is finally here. where knowledge and curiosity meet in trying to explain the world around us.

science was never about remembering certain formulas for a test. Science is about questions such as: Why is the sky orange at sunset? How do plants grow every day in silence? How do big discoveries come from small ideas?

Making this magazine reminded me that every question takes us closer to understanding the world and ourselves. Thank you for reading this edition and for joining us on this journey. I hope it makes you stop and think. as curiosity and knowledge certainly do add to the meaningfulness of life.

Editor in chief.
Vanya Gupta.10th

Wonders of Everyday Science

Have you ever played with magnets? They have a fascinating invisible force that can attract certain metals like iron and nickel. Every magnet has two ends, called the north pole and the south pole. Opposite poles attract each other, while same poles repel. This invisible area around a magnet where its force can be felt is called the magnetic field. Magnets are not just for fun; they are used in many things around us, from refrigerator doors to electric motors! There is also a whole universe of tiny living things around us that we cannot see with our naked eyes. These are called microbes or microorganisms. They include bacteria, viruses, fungi, and protozoa. Some microbes can cause diseases, but many others are very important for our health and the environment. For example, some bacteria help us digest food, while others help in breaking down waste. The world of microbes is diverse and plays a crucial role in our lives. Have you ever wondered how a light bulb lights up? It's because of something called an electric circuit. A simple circuit is a closed loop that allows electricity to flow. It usually includes a power source like a battery, wires to carry the electricity, and a device that uses the electricity, like a light bulb. For the bulb to glow, the circuit must be complete, allowing the electric current to travel from the battery, through the wires, to the bulb, and back to the battery. If the loop is broken, the current stops, and the bulb goes off.

Another interesting phenomenon is solar energy, which is the power we get from the Sun. It is clean, renewable, and eco-friendly. Solar panels capture sunlight and turn it into electricity. This can be used to power homes, schools, and even cars. Unlike coal or petrol, solar energy doesn't cause pollution. Many countries are now using solar farms to reduce their carbon footprint. In the future, solar energy might be our main source of power. The brain is also one of nature's greatest wonders. It is the most powerful part of the human body, controlling our thoughts, memories, emotions, and movements. Our brain works faster than any computer and uses electricity made by special cells called neurons. Scientists still don't fully understand how the brain works, but new technologies like brain scans are helping. Taking care of our brain by sleeping well, eating healthy, and learning new things keeps it sharp. Finally, there are volcanoes, which are openings in the Earth's surface that let out hot lava, gases, and ash. They are found mostly near tectonic plate edges. Some volcanoes are quiet for many years and then suddenly erupt. While they can be dangerous, volcanoes also create new land and release minerals into the soil, helping plants grow. Famous volcanoes include Mount Vesuvius in Italy and Mount Fuji in Japan.

By Bhavya Agarwal
10A

Universe and world beyond

The universe is everything. It includes all of space, and all the matter and energy that space contains. It even includes time itself, and of course, it includes you.
“Is there life beyond Earth?” – comes with an ironic asterisk: we don't really have a universally accepted definition of life itself. More than 5,800 exoplanets – planets around other stars – have been confirmed to exist in our galaxy, but they likely number in the trillions. One of the best tools scientists have to begin narrowing the search for habitable worlds is a concept known as the “habitable zone.” It’s the orbital distance from a star where temperatures would potentially allow liquid water to form on a planet’s surface. Many other conditions also would be required: a planet of suitable size with a suitable atmosphere, and a stable star not prone to erupting in sterilizing flares. Yet, the silence makes our responsibility to protect and cherish our own world even greater.

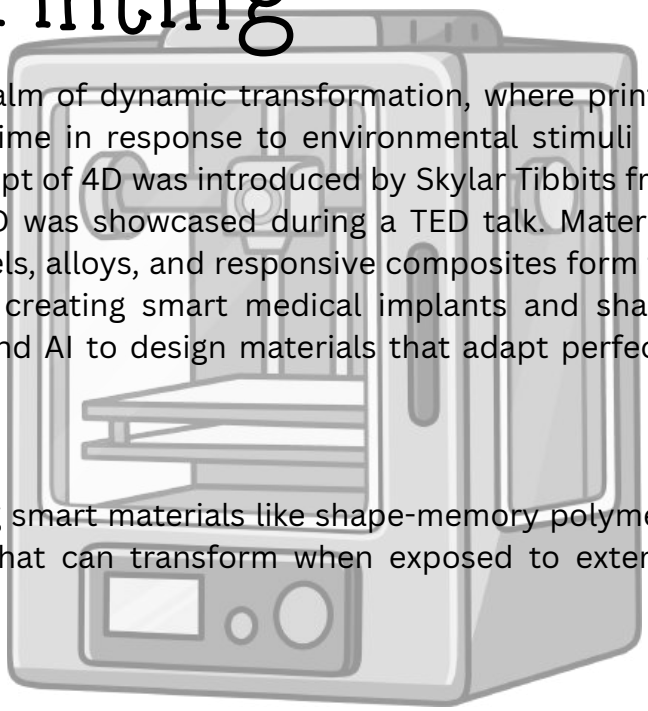
Avni Kaushik
10F

Time Travel: A Half-Solved Mystery

If you aren't sure about 'if time travel is possible or not'; then let me confirm that it's not impossible yet incomplete. Diving deep- the journey started with Einstein's 'Theory of Relativity' that was published in 1905 and was the rise of famous $E=mc2$('E' for energy; 'm' for mass; and $'c2'$ for squared speed of light), which reveals the link between mass and energy. When $E=mc2$ explains energy fuelling motion, comes 'Time Dilation' explaining speed stretching time, since it's known that time is relative; it is an act where time slows down for someone moving nearly at the speed of light compared to someone at rest. For instance, an astronaut moving nearly at the speed of light would age slowly than a person on the earth, but accelerating objects to that speed isn't easy as mass increase with the increasing speed and require more energy to move more mass for consistent acceleration and is the reason why, scientists lag to make it come true. So I would rather say that time travel is though proved theoretically, it is still incomplete or a half solved mystery or just the recipe waiting for the chef.

Saumya Saini
10F

4D printing



4D printing takes 3D printing into the realm of dynamic transformation, where printed objects change shape or function over time in response to environmental stimuli like temperature, light, or moisture. The concept of 4D was introduced by Skylar Tibbits from MIT's Self-Assembly Lab around 2013. 4D was showcased during a TED talk. Materials such as shape-memory polymers, hydrogels, alloys, and responsive composites form the backbone of 4D printing. Scientists are creating smart medical implants and shape-shifting micro-robots using 4D printing and AI to design materials that adapt perfectly inside the body.

Factors on which it depends:
4D printing builds on 3D printing by using smart materials like shape-memory polymers, hydrogels, or liquid crystal elastomers that can transform when exposed to external factors like:

- Temperature changes
- Humidity or water exposure
- UV or infrared light
- Magnetic or electric fields
- pH levels

Key point: 4D-printed structures are programmable, meaning they can evolve over time without human intervention.

How it works:
Engineers use modeling to know how the material will deform.

Material Selection:
Smart materials are chosen based on the desired response. For example, heat-sensitive polymers for temperature-triggered changes. Internal stresses or material properties cause it to self-assemble into the final shape.

3D Printing Process:
The object is printed layer by layer, embedding the responsive properties.

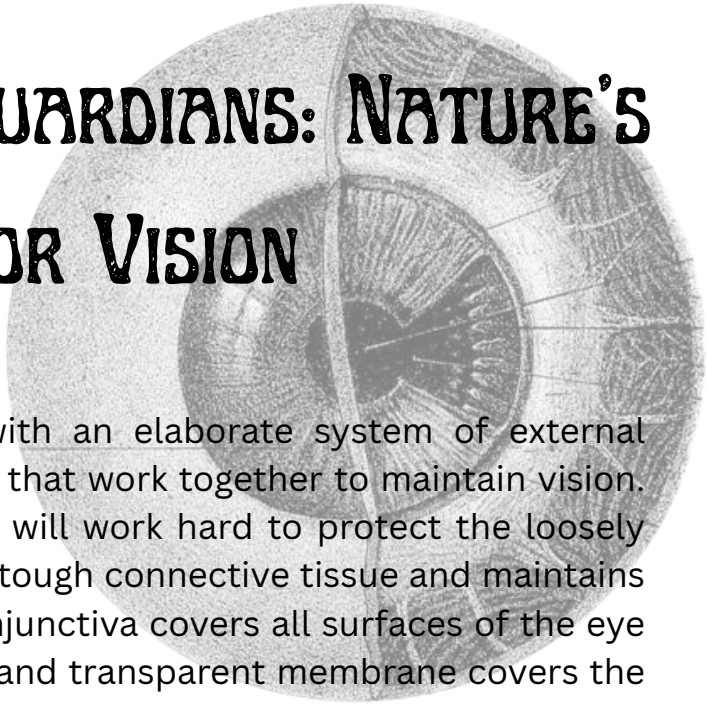
Stimulus-Responsive Transformation:
Once exposed to the trigger, like water or heat, the object changes shape into a pre-programmed configuration.

Future plans:
In the coming decades, we might see:

- Bridges that repair their own cracks.
- Clothing that adjusts to climate in real time.
- Disaster-relief shelters that unfold themselves on-site without tools.

Sayuri Sinha
10th E

The Eye's Outer Guardians: Nature's Design for Vision

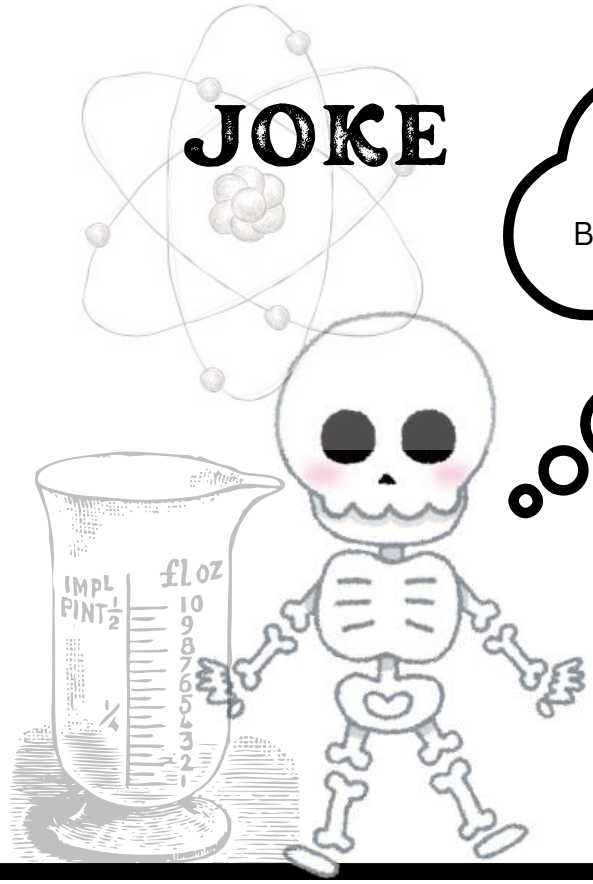


The human eye is well equipped with an elaborate system of external anatomy and protective components that work together to maintain vision. The sclera, or white area, of the eye will work hard to protect the loosely organized inside bits, as it is made of tough connective tissue and maintains the eye's spherical structure. The conjunctiva covers all surfaces of the eye except the corneal surface. This thin and transparent membrane covers the eyelids and the center or scleral eye area. The conjunctival surface creates constant moisture and provides additional surface guarding from irritants. In front, the cornea is primarily transparent with a dome shape which allows for primary refraction, bending light to focus pictures on the retina. Surrounding the circular hole in the center is the iris, or colored part of the eye, which is a muscular structure that adjusts the size of the pupil to adjust the amount of light entering the eye. The iris is also responsible for the balance of protection and clarity. Together these structures will protect the eye from contaminants while beginning the complex procedure of vision.

Aaradhy singhal
10A

JOKE

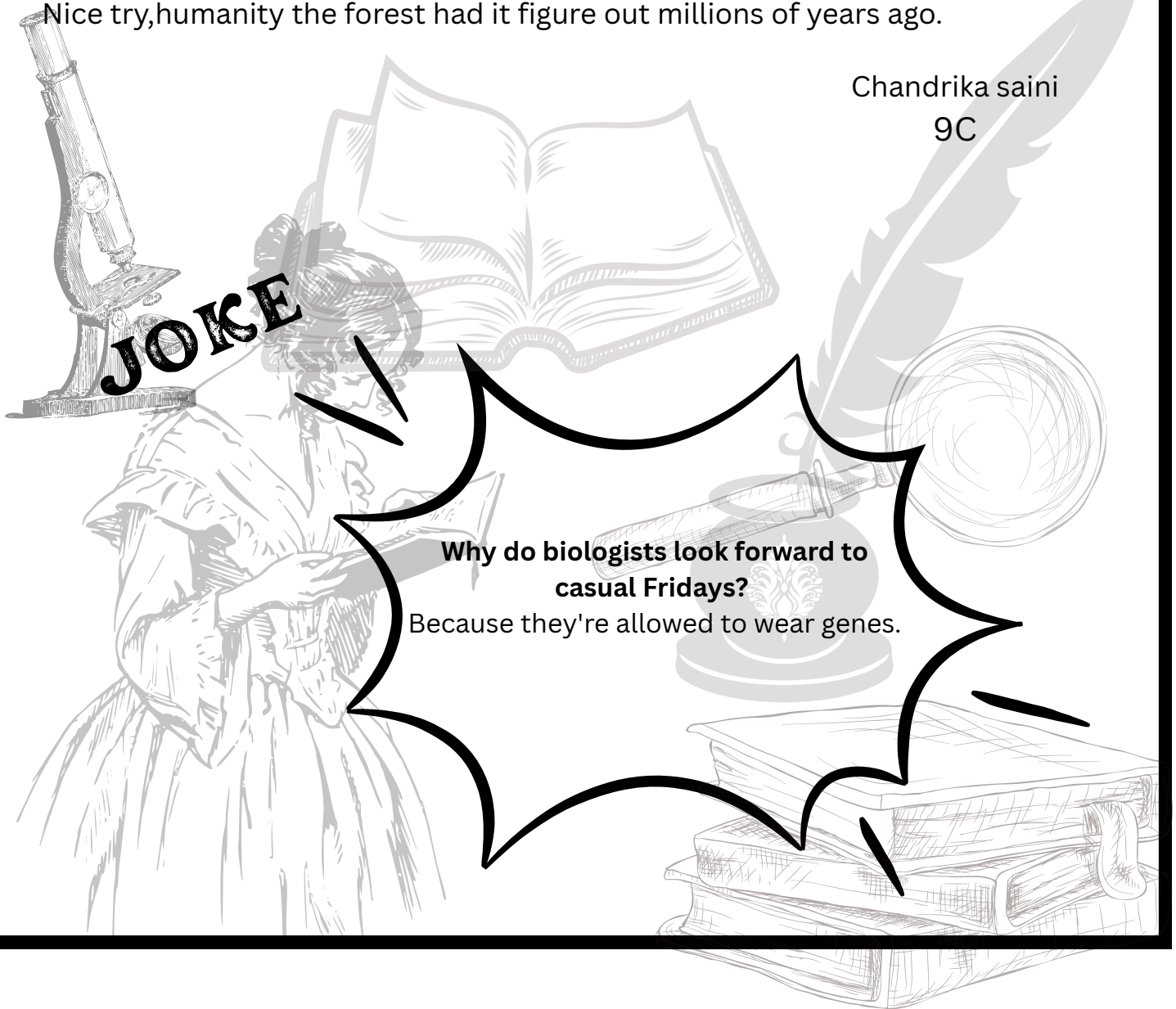
Why did Newton get kicked out of art class?
Because he kept drawing forces.



PLANTS COMMUNICATE USING THE WOOD WIDE WEB

Oh sure, we've always thought trees were just tall leafy decorations ,soaking up sunlight and minding their own business right? Turns out, while we were busy inventing the internet trees were already running there own underground fungal Wi-Fi system the -"wood wide web " Beneath the forest floor, fungi (specifically a type called mycorrhizal fungi) form huge underground networks. These fungi attach themselves to the roots of trees and plants, creating an enormous, connected system - almost like a natural internet. Through this fungal network. They are basically gossiping 24/7 ,sending food deliveries to their favourite seedlings, leaking insider information about incoming best attacks and even playing doctor by nursing sick neighbours back to health, all while pretending to just stand there.
Meanwhile, we're e out here thinking we invented communication network Nice try,humanity the forest had it figure out millions of years ago.

Chandrika saini
9C



JOKE

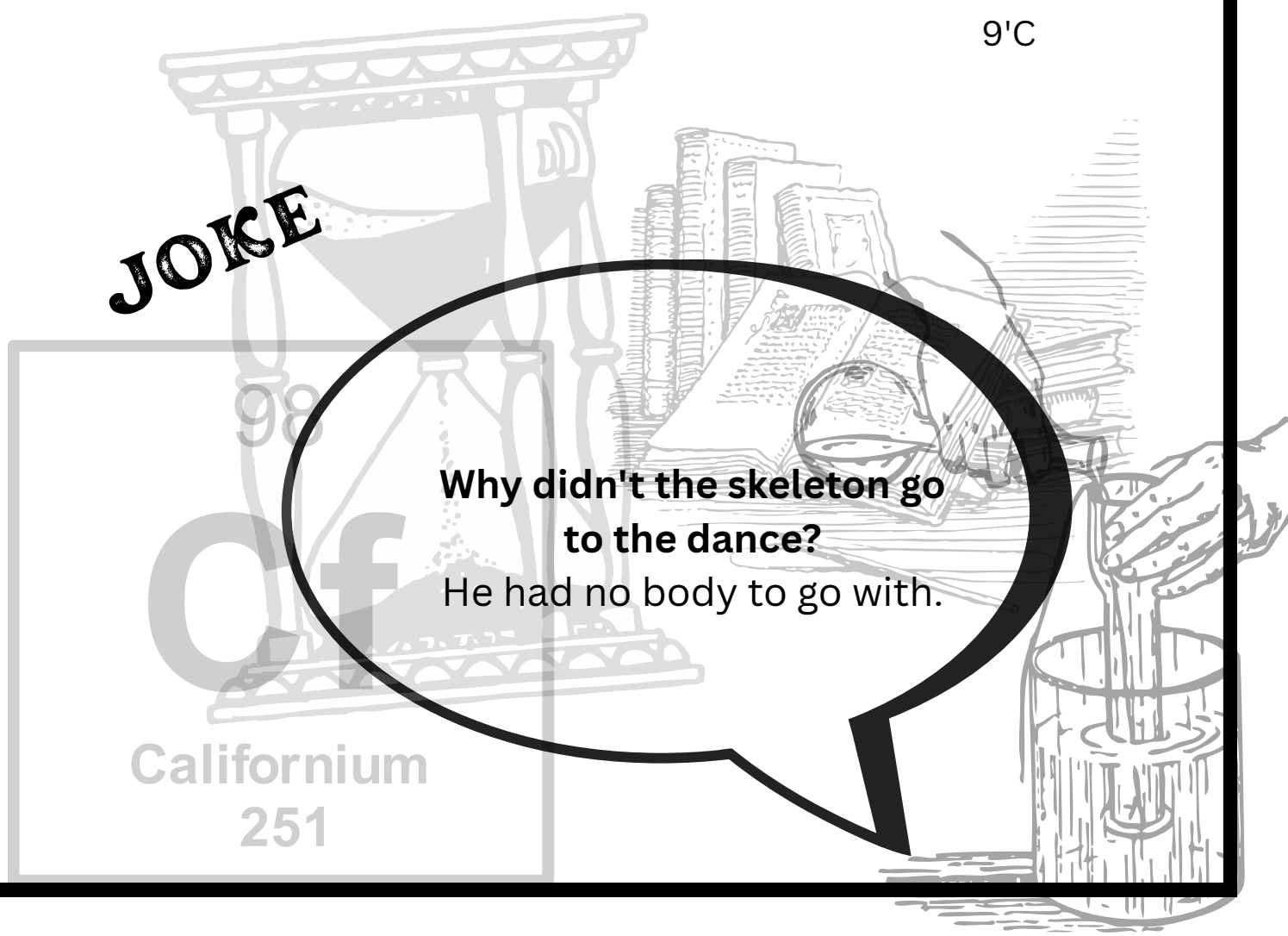
Why do biologists look forward to casual Fridays?
Because they're allowed to wear genes.

The Confidence Flame: How Your Brain Sparks Inner Strength

The feeling of a gentle burst of energy you sometimes feel might not be just a feeling; it could be your brain signaling an increase in confidence. Neurologists are making connections between the feeling of warmth and the amygdala, the emotional part of the brain, and the prefrontal cortex, which helps control impulses and make decisions. During the teenage years, as the brain is still developing, self-doubt often escalates—but resilience often increases as well. Remember that gentle warmth? That's awoken energy just for you! Researchers suggest that we use the "Flame Focus" method: when you notice the feeling, just close your eyes for 10 seconds, take a nice big breath, and repeating the affirmation "I have got this." Students that have used the process report having up to a 60% increase in confidence and positive changes in their performance at school, turning an ephemeral sensation into a really effective tool for growth!

Labiba
9'C

JOKE



Why didn't the skeleton go to the dance?
He had no body to go with.

What If an Ancient Civilization Lived in the Ocean?

We always imagine aliens in outer space... but what if something smarter than us lived right here on Earth - deep in the ocean-long before we even existed? Think about it: over 70% of Earth is covered by water, and most is still unexplored. The deep sea is pitch black, freezing cold, and full of strange glowing creatures that don't even need sunlight to survive. So, what if a secret underwater civilisation existed thousands (or even millions) of years ago? Maybe they didn't need fire or tools like us. Maybe they used sound, light, or magnetic energy to talk or build. And since water destroys almost everything over time, perhaps that's why we've never found any signs of them. In 1997, scientists recorded a deep-sea sound so loud and strange they named it "The Bloop." It didn't match any whale, volcano, or machine.

Officially? "Maybe ice." Unofficially? No one knows. So... what if Earth's biggest mystery isn't up in the sky-but right below us? Fun Fact! Only 5% of the ocean has been explored.

That means 95% is still a magnificent mystery, inviting us to explore the unknown. Who knows what wonders lie beneath?

Yashasvi,
9F

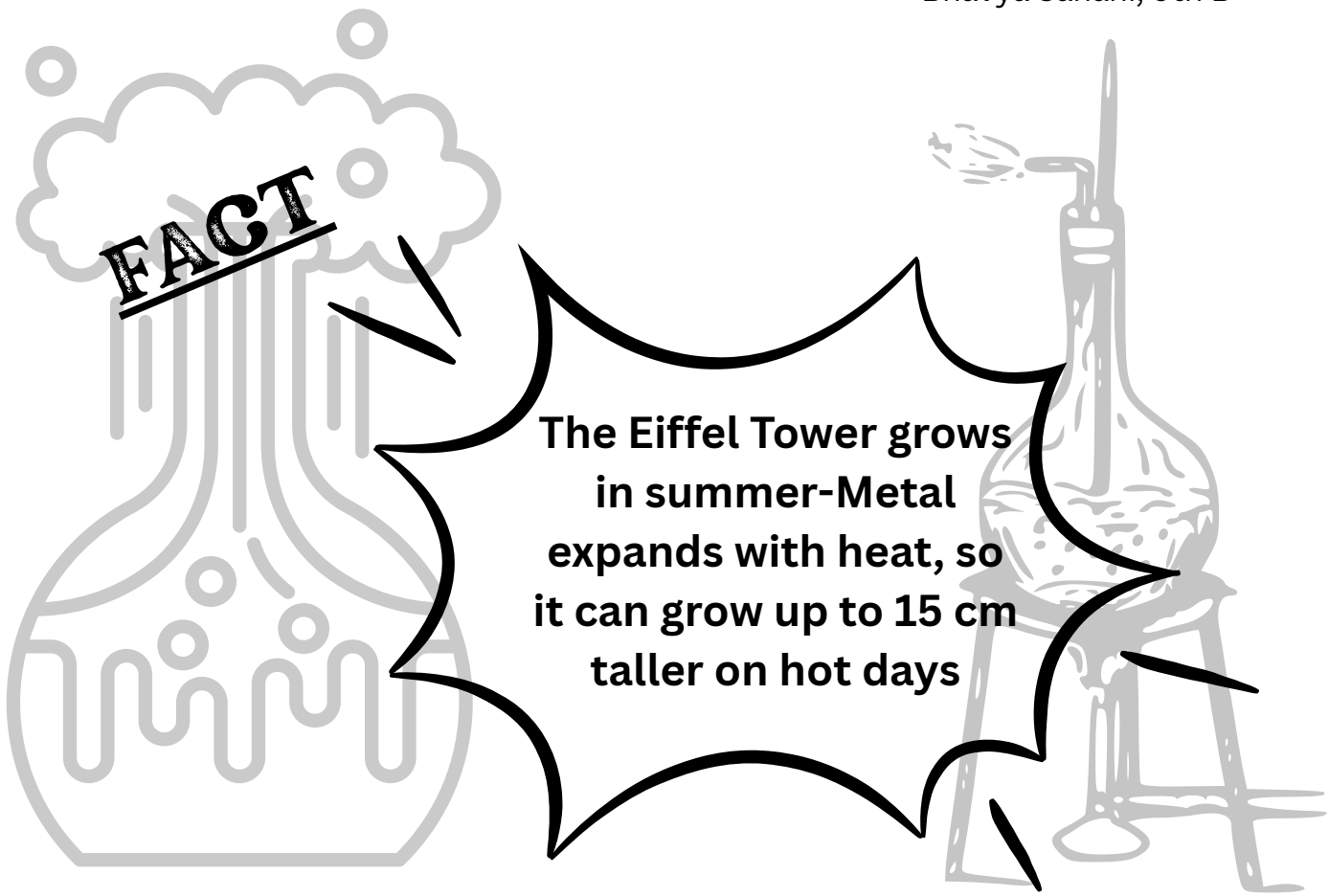
Why can't electrons be trusted?

They're always negative.

Postcards from the solar system

Have you ever wondered what if there was someone else living in this universe? Somewhere in a distant land where the scientists haven't reached yet?
Try sending a mail or a letter to an alien pen pal in some far-off neighborhood,although you may need more than just a street or city name. You may also need to mention to your alien friend that you live on Earth (the third of eight planets).
For hundreds of years, scientists have been trying to search for alien life. However, due to the enormous size of outer space, they have been unable to do so. Mars (the fourth planet from the sun, also called "The red planet") was once considered the best candidate for alien life, but so far, we haven't found any Martians.Astronomers have discovered nearly 4,000 exoplanets beyond our solar system and are spotting more every single day.
On a planet circling a distant star, in a galaxy yet unnamed, a curious alien might be reading your words right now... wondering if they're alone too.
Because in a vast universe, the possibilities are endless—and who knows? The next "Hello" could come from the stars.

~ Bhavya Sahani, 9th B

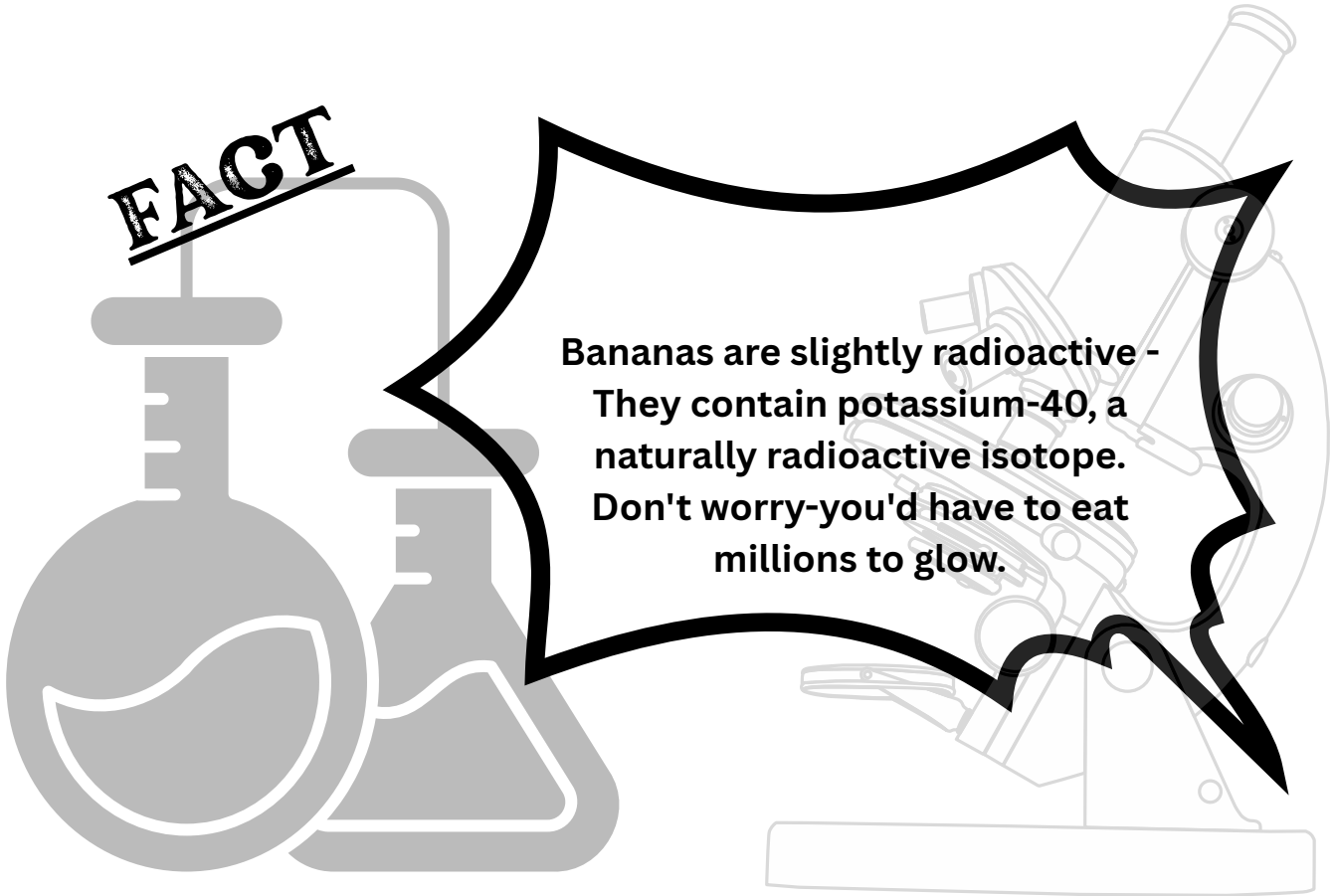


Hidden Healers

Stem cells are the body's master cells. While they are found throughout the body, two surprisingly rich sources are wisdom teeth and the placenta, which supports a baby in the womb. These cells hold immense potential for treating a variety of diseases, many of which can be present from birth.The abilities such as self-renewal, differentiation (can differentiate into various specialized cells) and regenerative capacity of these stem cells makes them valuable for treating numerous conditions, including: Placental stem cells are being used to treat Immune System Disorders, Blood and Metabolic Disorders while stem cells from wisdom teeth can treat Neurodegenerative Disorders like Parkinson's and Alzheimer's disease.

Beyond their ability to directly replace damaged cells, wisdom teeth and placental stem cells primarily function through a process called paracrine signaling. This means that instead of just becoming new tissue, the cells act as miniature biological factories, secreting a cocktail of therapeutic factors. These factors include growth factors, cytokines,and other signaling molecules that communicate with and positively influence surrounding host cells.

Sayona Sinha
10th-F



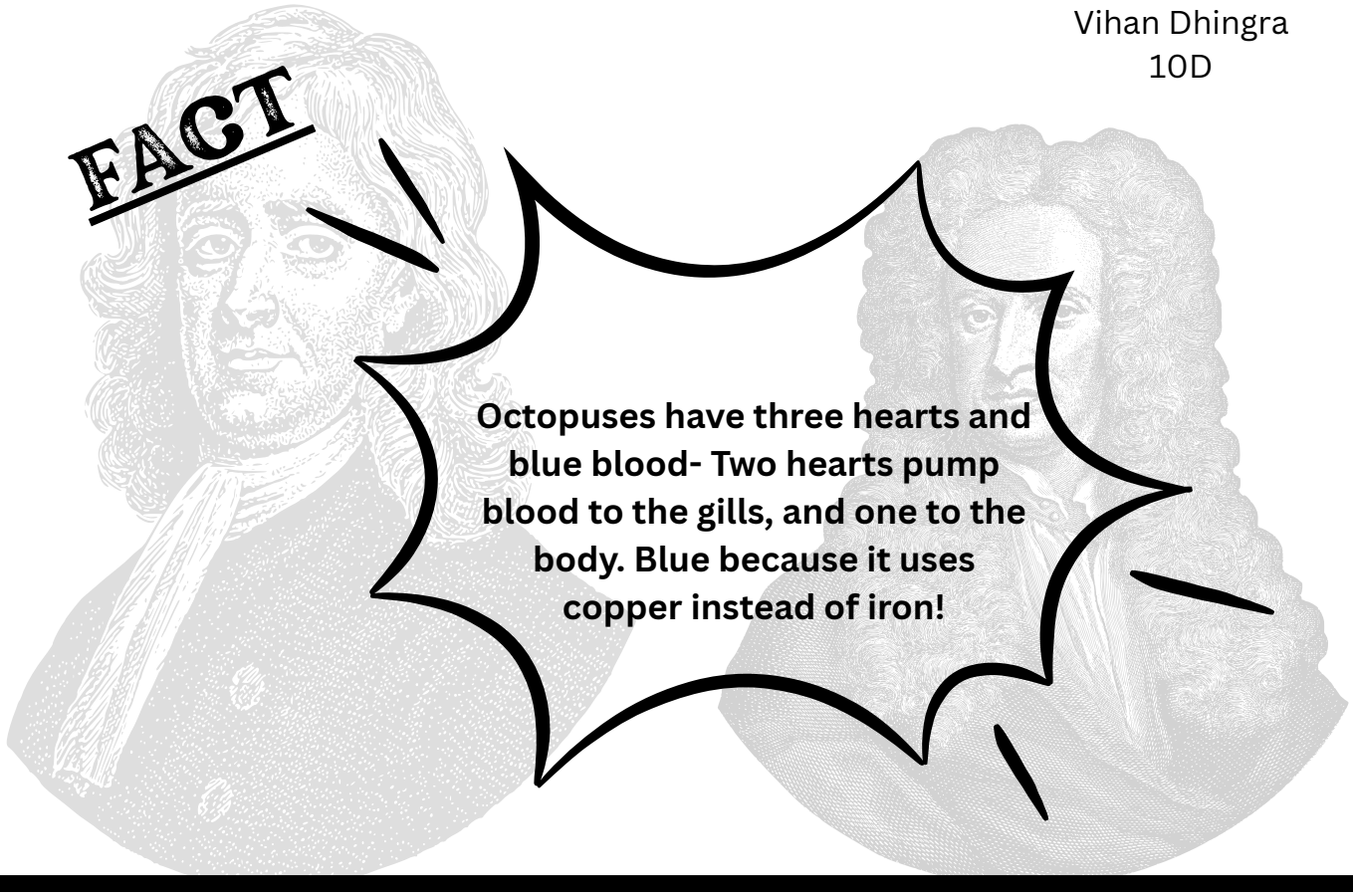
Zombie parasites and their gruesome effects

Imagine you're a snail, life's pretty fun, you mostly forage for food, navigate your environment and sleep a lot. Who wouldn't want that? You eat some weird looking "caterpillar" and suddenly, your eye starts pulsating lights like you're signaling birds to go on and eat you! Well this is because an intruder has hijacked your body! This was no caterpillar, something much more sinister....

The parasite called Leucochloridium paradoxum or the green-banded broodsac is a fascinating creature in the way it functions, it infects snails to make them basically try their best to be more attractive to their predators like birds, it tries all it can to make it seem like the easiest prey for an animal, it makes them stay in well-lit places longer, so you stick out like a sore thumb in every place you go. It hijacks all your functions to where you basically become a machine controlled by a host who tries its best to make you get eaten. They do such imitations so they can get into the digestive system of a bird and lay eggs in their feces in hopes of getting into another snail's digestive system and ultimately continuing this process all over again. Infected snails may live for at least a year and continue to see through the ends of their tentacles, they are still able to reproduce. The appearance and behaviour of the is a case of aggressive mimicry, where the parasite vaguely resembles the food of the host, thereby gaining the parasite entry into the host's body by being eaten. This is unlike most other cases of aggressive mimicry, in which the mimic eats the duped animal.

If evolution can make such disturbing creations that might be able to zombify an animal, imagine what kind of creepy crawlies might lie on other planets!

Vihan Dhingra
10D



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BE CURIOUS ! STAY UPDATED FOR THE NEXT EDITION